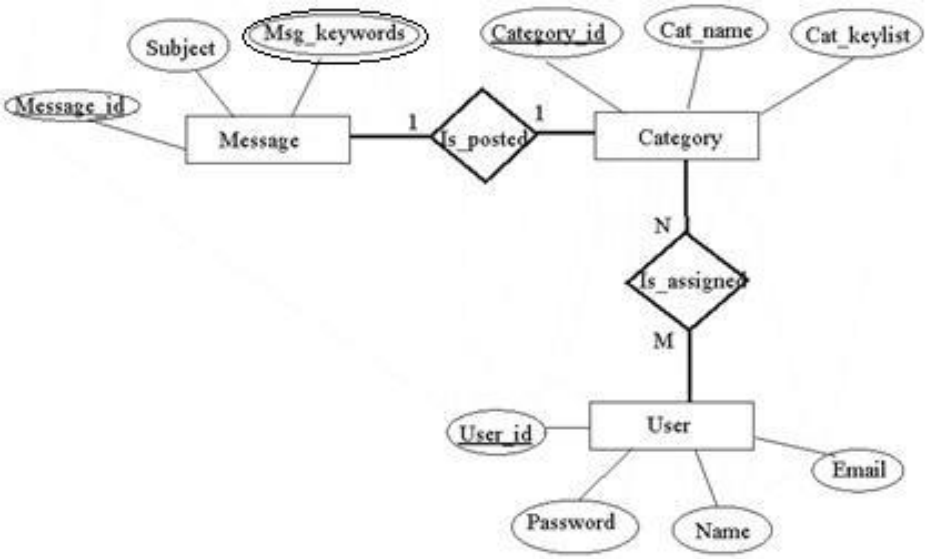
SVKM's
D. J. Sanghvi College of Engineering

Program: B.Tech in Information Technology **Academic Year: 2022** **Duration: 3 hours**
Date: 23.01.2023
Time: 09:00 am to 12:00 pm
Subject: Database Management System (Semester III) **Marks: 75**

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.
(1) This question paper contains three pages.
(2) All Questions are Compulsory.
(3) All questions carry equal marks.
(4) Answer to each new question is to be started on a fresh page.
(5) Figures in the brackets on the right indicate full marks.
(6) Assume suitable data wherever required, but justify it.
(7) Draw the neat labelled diagrams, wherever necessary.

Question No.		Max. Marks
Q1 (a)	Draw an ER model for library management application considering the following constraints − • In a library multiple students can enrol. • Students can become a member by paying an appropriate fee. • The books in the library are identified by a unique ID. • Students can borrow multiple books from subscribed libraries.	[10]
Q1 (b)	i. List and explain characteristics of databases. **OR** ii. What do you mean by Database Administrator (DBA)? Explain role of a DBA.	[05] [05]
Q2 (a)	Consider the following database schema *branch (branch_name, branch_city, assets)* *customer (customer_name, customer_street, customer_city)* *account (account_number, branch_name, balance)* *loan (loan_number, branch_name, amount)* *depositor (customer_name, account_number)* *borrower (customer_name, loan_number)* i. Answer the following SQL queries with respect to the given database schema a. Find the loan number for each loan of an amount greater than 20000 b. Find the name and street of all customers who have a loan from the bank c. Find the names of all customers whose account balance is between 5000 to 50000	 [02] [02] [03]

	d. Display the branch names sorted in alphabetically descending order with total number of accounts in each branch only from Mumbai city **OR** ii. Answer the following relational algebra queries with respect to the given database schema a. Find all loans of over 1200 b. Find the loan number for each loan of an amount greater than 1200 c. Find the names of all customers who have a loan, an account, or both, from the bank d. Find the names of all customers who have a loan and an account at bank. e. Find the names of all customers who have a loan at the Mumbai branch.	[03] [01] [02] [02] [02] [03]
Q2 (b)	Convert the given ER diagram to Relational mapping  	[05]
Q3 (a)	Discuss the types of cursors along with the cursor attributes. Support with an example.	[07]
Q3 (b)	i. Describe Functions and Procedures in detail. **OR** ii. Discuss the referential integrity constraint with appropriate example.	[08] [08]
Q4 (a)	i. Apply conflict serializability to the schedule given below to check whether it is serializable or not. If serializable, then obtain the serial schedule. Discuss each step. **Schedule S:** R1(A), W1(A), R3(A), W3(A), R2(A), R1(B), R3(B), W1(B), W3(B), R2(B) **OR** ii. Consider the following schedule. Assume TS(T1) =10, TS(T2) =20 and TS(T3) =30. Apply timestamp ordering protocol to the following schedule, justify the rule applied at each step. **Schedule S:** R1(A), R2(A), W1(A), R3(B), R1(B), W2(B), W3(B) Find the values of RTS(A), WTS(A), RTS(B) and WTS(B).	[08] [08]

<table>
<tr><td>Q4 (b)</td><td>Find the highest normal form of a relation R (A, B, C, D, E) with FD set as {BC→D, AC→BE, B→E}</td><td>[07]</td></tr>
<tr><td>Q5 (a)</td><td>After a crash, the following log is found. Use ARIES algorithm to perform recovery and explain each step in detail.
<table>
<tr><td>0</td><td>BEGIN CHECKPOINT</td></tr>
<tr><td>5</td><td>END CHECKPOINT (EMPTY XACT TABLE AND DPT)</td></tr>
<tr><td>10</td><td>T1: UPDATE P1 (OLD: YYY NEW: ZZZ)</td></tr>
<tr><td>15</td><td>T1: UPDATE P2 (OLD: WWW NEW: XXX)</td></tr>
<tr><td>20</td><td>T1: COMMIT</td></tr>
</table></td><td>[07]</td></tr>
<tr><td>Q5 (b)</td><td>i. What are the two classifications for ordered indices? Explain each indexing with suitable diagrams.
OR
ii. Describe B Trees in detail. Also mention its uses in databases.</td><td>[08]

[08]</td></tr>
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